Remarks

In view of the following discussion, the Applicants submit that none of the claims now pending in the application is anticipated or made obvious under the provisions of 35 U.S.C. § 102 and § 103. Thus, the Applicants believe that all of these claims are now in allowable form.

I. REJECTION OF CLAIMS 1, 4, 8, 9, 11, 13, 15, 16, 18 UNDER 35 U.S.C. § 102

The Examiner has rejected claims 1, 4, 8, 9, 11, 13, 15, 16, 18 in the Office Action under 35 U.S.C. § 102 as being anticipated by Suzuki (US Patent 5,787,122, issued July 28, 1998, herein referred to as Suzuki). Applicants respectfully traverse the rejection.

Suzuki teaches a method and apparatus for transmitting and receiving encoded data as burst signals using a number of antennas. Specifically, Suzuki teaches a reception system that sends a reception signal encoded and dispersed into a plurality of symbols. (See Suzuki, Column 9, Lines 2-6.) The reception signal is then received by a plurality of antennas. (See Suzuki, Column 9, Lines 7-12). Each time the antenna switcher receives burst data, the antenna switcher switches the antenna under control of the communication control unit. The antennas may be selected in the previously determined sequential order or may be randomly selected based on data generated at random. (Emphasis added, See Suzuki, Column 9, Lines 13-26.) Then the reception signal obtained is demodulated, deinterleaved and reconverted into the original data. (See Suzuki, Column 9, Lines 27-33.)

The Examiner's attention is directed to the fact that Suzuki fails to teach or to suggest the novel concept of switching between a first antenna and a second antenna in response to a predefined schedule of a sequence of scheduled packet bursts, where said switching switches a receiver from a first mode of operation to a second mode of operation in response to a request for QoS improvement, as positively claimed by the Applicants. Specifically, Applicants' amended independent claims 1, 8, and 13 positively recite:

1. A radio receiver comprising:

first and second antennas connected to RF processing circuitry by an RF switch; and

an RF switch control in communication with said RF switch, where said RF switch control is for switching said radio receiver from a first mode of operation to a second mode of operation in response to a request for QoS improvement, where said RF switch control being switched in response to a predefined schedule of a sequence of scheduled packet bursts in accordance with said second mode of operation, wherein said first mode of operation comprises a conventional mode and said second mode of operation comprises a multiple burst mode. (Emphasis added)

8. A method of achieving a QoS control in a wireless LAN communication system, comprising steps of:

transmitting a message contained within a plurality of packet bursts occurring at spaced time intervals;

receiving each of the packet bursts individually at one of a plurality of antennas in accordance with a predefined schedule, where said predefined schedule is used to select one of said plurality of antennas for receiving each of said packet bursts, where said antenna selection is performed in accordance with switching from a conventional mode of operation to a multiple burst mode of operation in response to a request for QoS improvement. (Emphasis added)

13. A communication system for coupling a transmitter and a receiver adapted for receiving at least first and second signal bursts by first and second antennas respectively, and responding to the two signal bursts to communicate a single unified message at the receiver; whereby:

the first and second signal bursts are sequentially separated in time in accordance with a predefined schedule;

the first and second antennas are sequentially enabled in accordance with said predefined schedule to communicate with at least one storage medium at the receiver, where said antenna enablement is performed in accordance with switching from a conventional mode of operation to a multiple burst mode of operation in response to a request for QoS improvement; and

enabling a representation of the unified message by responding to the first and second signal bursts. (Emphasis added)

Applicants' invention provides a method and system for the reception of digital radio signals using a protocol assisted switched diversity antenna system. One aspect of the invention is that the antennas are switched in response to packet bursts or signal bursts that are scheduled or ordered by time intervals. Namely, the antennas are switched in accordance with a predefined schedule. For example, Applicants' specification (Paragraph 0018) discloses:

> When the base station determines that downlink (to the client) traffic has arrived from the network, it schedules a series of burst transmissions (in this example, two). The base station initiates message transmission by issuing a polling request, followed by the first packet burst. The first burst, containing the message, will be received exclusively on the antenna which has been in use (the RF switch remains set for the duration of the burst). While the burst is being received, the receiver's output (soft symbols and signal strength values) is stored sequentially in buffer 107. At the conclusion of the base station's transmission, the client transmits a polling response, followed by any uplink (to the base station) traffic it may have to send. The microprocessor, which has been adhering the protocol, immediately causes the RF switch to connect the alternate antenna to the receiver, in preparation for reception of the second burst, containing the same message. At some later moment in the current superframe or a subsequent superframe, the base station transmits a second polling request and the second packet burst. This burst is received exclusively using the second antenna; the receiver output is similarly stored sequentially in buffer 108. (Emphasis added.)

Thus, the packet bursts are first scheduled and then sent to the receiver in accordance with that predefined schedule. Similarly, the switching of the antennas is also performed in accordance with the predefined schedule. It should be noted that polling is implemented between the receiver and the base station so that the scheduling of the packet bursts are synchronized.

Furthermore, Applicants' invention allows the receiver to switch between two operational modes: a conventional mode and a multiple burst mode. Specifically, the switching between the two modes is performed in response to a request for QoS improvement. For example, for high priority traffic or where traffic requires the highest QoS performance, the receiver can be selected to operate in the multiple burst mode instead of the conventional mode. Once the high priority traffic is received or where the higher QoS requirement is no longer needed, the receiver can return to the conventional mode. (See Applicants' specification, Paragraphs 15 and 16) Thus, the Applicants' invention advantageously achieves QoS control in wireless LAN communication systems.

The Applicants respectfully submit that the Examiner has interpreted the definition of TDMA too broadly. The Examiner states that "Suzuki discloses that the system is a TDMA system . . . so all transmissions and receptions are according to a

predefined schedule of a sequence of scheduled packet bursts." However, the Examiner has failed to explain how being a TDMA system anticipates switching between a first antenna and a second antenna in response to a predefined schedule of a sequence of scheduled packet bursts. The Applicants respectfully assert that TDMA simply defines how data packets are transmitted and received, as the Examiner asserts, but does not teach, show or suggest how a RF switch controller will select an antenna. As such, Suzuki clearly fails to teach or suggest an RF switch control for switching a plurality of antennas in response to a predefined schedule of a sequence of scheduled packet bursts, e.g., packet bursts occurring at scheduled spaced time intervals. In contrast, Suzuki's antennas are switched in response to a previously determined sequential order or may be randomly selected based on data generated at random. (See Suzuki, Column 9, Lines 21-24.) A predefined sequential order and a random order is not a predefined schedule. Nor does claiming to be a TDMA system teach how a RF control switch is controlled.

Furthermore, the Applicants respectfully submit that even if TDMA theory could be used for RF switch control, that TDMA still does not teach, show or suggest the Applicants' invention. TDMA is not a predefined schedule of packet bursts, but rather a sequence of packet bursts. "Schedule" is defined by dictionary.com as "[a] plan for performing work or achieving an objective, specifying the order and allotted time for each part." (See www.dictionary.com, Emphasis Added.) The Applicants' invention teaches RF switch control for switching a plurality of antennas in response to a predefined schedule of a sequence of scheduled packet bursts because the predefined schedule instructs which antenna to receive from first (i.e. the order) and the amount of time displacement (i.e. the allotted time). In contrast, TDMA is not analogous to the "predefined schedule" of the Applicants' invention because time slots in TDMA are fixed. The order that packets are transmitted or received are limited by the sequence of the time slots. As such, TDMA theory cannot be meaningfully used to teach RF switch control as taught by the Applicants' invention.

Furthermore, Suzuki fails to teach or suggest where the receiver can be controlled to operate in one of two possible modes in response to a request for QoS improvement. Namely, Suzuki fails to teach that in response to a request for QoS

improvement, the receiver will operate in the burst mode and then returning to a conventional mode after the QoS requirement is no longer needed.

Therefore, Applicants respectfully submit that independent claims 1, 8 and 13 are clearly patentable and not anticipated by Suzuki. Furthermore, dependent claims 4, 9, 11, 15, 16 and 18 depend from claims 1, 8 and 13, respectively, and recite additional limitations. As such, and for the exact same reason set forth above, the Applicants submit that claims 4, 9, 11, 15, 16 and 18 are also patentable and not anticipated by Suzuki.

II. REJECTION OF CLAIMS 2, 3, 5-7, 10, 12, 14, 17 and 19-21 UNDER 35 U.S.C. § 103

A. Claims 2, 3 and 12

The Examiner has rejected claims 2, 3 and 12 in the Office Action under 35 U.S.C. § 103 as being unpatentable over Suzuki in view of Aaronson et al. (US 6,363,062, issued March 26, 2002, herein referred to as Aaronson). Applicants respectfully traverse the rejection.

The teachings of Suzuki have been discussed above. Aaronson teaches a communications protocol for packet data. A MAC layer schedules communication bursts taking into account factors such as propagation delay between the different nodes, queuing of data and synchronization of the time transmitting from multiple nodes. (See Aaronson, Column 3, Lines 22-30.)

However, Aaronson fails to bridge the substantial gap left by Suzuki. Specifically, Aaronson also fails to disclose the novel concept of switching between a first antenna and second antenna in response to a predefined schedule of a sequence of scheduled packet bursts, where said switching switches a receiver from a first mode of operation to a second mode of operation in response to a request for QoS improvement.

As stated above, Suzuki simply does not teach or suggest the novel concept of switching between a first antenna and second antenna in response to a predefined schedule of a sequence of scheduled packet bursts or in response to a request for QoS improvement. Rather, the antennas in Suzuki are switched in accordance with a

previously determined order or randomly selected based on data generated at random. (Emphasis added, See Suzuki, Column 9, Lines 21-24.) Suzuki does not teach antennas that have the capability of being switched in response to scheduled packet or signal bursts or in response to a request for QoS improvement. This deficiency is not bridged by the teaching of Aaronson because Aaronson only teaches using MAC protocol to schedule packet data. (See Aaronson, Column 3, Lines 22-30.)

In arguendo, even if Suzuki and Aaronson were combined, the combination would still not teach or suggest Applicants' invention. The combination of Suzuki and Aaronson would only teach a method and apparatus for transmitting and receiving data packets using a number of antennas; where each antenna, that receives the data packets, is chosen in a pre-determined order or randomly. Therefore, the combination of Suzuki and Aaronson does not teach or suggest Applicants' invention as recited in independent claims 1 and 8.

Dependent claims 2, 3 and 12 depend from claims 1 and 8, respectively, and recite additional limitations. As such, and for the exact same reason set forth above, the Applicants submit that claims 2, 3 and 12 are also not made obvious by the teachings of Suzuki and Aaronson.

B. Claims 5 and 6

The Examiner has rejected claims 5 and 6 in the Office Action under 35 U.S.C. § 103 as being unpatentable over Ohashi et al (EP 0740430, herein referred to as Ohashi) in view of Khayrallah (XP-000889044, herein referred to as Khayrallah). Applicants respectfully traverse the rejection.

Ohashi teaches a diversity radio communication system where an antenna switch circuit switches the first and second antennas to connect them to the transmit/receive switch circuit. (See Ohashi, Page 6, lines 1-8.)

Khayrallah teaches an improved time-diversity method. The number of antennas are grouped based on the depth of the interleaver. Then the antennas are selected according to conventional selection diversity methods such as, to maximize signal

strength or signal-to-noise ratio. (See Khayrallah, Paragraph 2, Lines 10-11.) In another embodiment, the antennas can be cycled in a pre-determined pattern or at random. (See Khayrallah, Paragraph 3, Lines 4-5.)

However, Ohashi and Khayrallah (either singly or in any permissible combination) fail to teach, show or suggest the Applicants' invention. Specifically, Ohashi and Khayrallah fail to disclose the novel concept of switching between a first antenna and second antenna in response to a predefined schedule of a sequence of scheduled packet bursts or in response to a request for QoS improvement. Applicants' amended independent claim positively recites:

> 5. (Currently Amended) A method of maintaining a controlled QoS in a wireless communication system, comprising steps of:
> receiving scheduled communications from a transceiver at a transmission station in accordance with a predefined schedule by wireless transceivers at receiving stations having switched protocol diversity reception operational modes comprising a conventional mode and a multiple burst mode, where said scheduled communications being formatted as multiple packet bursts in accordance with said multiple burst mode and in response to a request for QoS improvement;
> enabling a first antenna to receive a first packet burst in accordance with said predefined schedule;
> enabling a second antenna to receive a second packet burst in accordance with said predefined schedule;
> recording the received bursts as soft information in a storage medium; and
> combining the soft information from the first and second bursts into a single message. (Emphasis added.)

In arguendo, even if Ohashi and Khayrallah were combined, the combination would still not teach or suggest Applicants' invention. The combination of Ohashi and Khayrallah would teach a diversity radio communication system that would switch to a particular antenna chosen from a group of antennas; the receiver cycling through the groups of antennas in a pre-determined order or at random. Therefore, the combination of Ohashi and Khayrallah does not teach or suggest Applicants' invention as recited in independent claim 5.

Therefore, Applicants respectfully submit that independent claim 5 is clearly patentable and not made obvious by Ohashi and Khayrallah. Furthermore, dependent claim 6 depends from claims 5 and recites additional limitations. As such, and for the

exact same reason set forth above, the Applicants submit that claim 6 is also not made obvious by the teachings of Ohashi and Khayrallah.

C. Claim 7

The Examiner has rejected claim 7 in the Office Action under 35 U.S.C. § 103 as being unpatentable over Ohashi in view of Khayrallah, and further in view of Suzuki. Applicants respectfully traverse the rejection.

The teachings of Ohashi, Khayrallah and Suzuki have been discussed above. However, the combination of Ohashi, Khayrallah and Suzuki fail to teach, show or suggest the Applicants' invention. Specifically, the Ohashi, Khayrallah and Suzuki fail to disclose the novel concept of switching between a first antenna and second antenna in response to a predefined schedule of a sequence of scheduled packet bursts or in response to a request for QoS improvement.

In arguendo, even if Ohashi, Khayrallah and Suzuki were combined, the combination would still not teach or suggest Applicants' invention. The combination of Ohashi, Khayrallah and Suzuki would teach a diversity radio communication system that could send an encoded signal over a plurality of burst data that would switch to a particular antenna chosen from a group of antennas; the receiver cycling through the groups of antennas in a pre-determined order or at random. Therefore, the combination of Ohashi, Khayrallah and Suzuki does not teach or suggest Applicants' invention as recited in independent claim 5.

Dependent claim 7 depends from claims 5 and recites additional limitations. As such, and for the exact same reason set forth above, the Applicants submit that claim 7 is also not made obvious by the teachings of Ohashi, Khayrallah and Suzuki.

D. Claims 10

The Examiner has rejected claim 10 in the Office Action under 35 U.S.C. § 103 as being unpatentable over Suzuki in view of Struhsaker et al. (US 2002/0141355, published October 3, 2002, herein referred to as Struhsaker). Applicants respectfully traverse the rejection.

The teachings of Suzuki have been discussed above. Struhsaker teaches a wireless access system and associated method using multiple modulation formats in TDD frames according to subscriber service type. Further, Struhsaker teaches that information can be sent in packet data units (PDU). Each PDU can be broken into segments that are protected by FEC CRC fields, thus avoiding wasting bandwidth. (See Struhsaker, Page 12, Paragraph 159.)

However, Struhsaker fails to bridge the substantial gap left by Suzuki. Specifically, Struhsaker also fails to disclose the novel concept of switching between a first antenna and second antenna in response to a predefined schedule of a sequence of scheduled packet bursts or in response to a request for QoS improvement.

As stated above, Suzuki simply does not teach or suggest the novel concept of switching between a first antenna and second antenna in response to a predefined schedule of a sequence of scheduled packet bursts or in response to a request for QoS improvement. Rather, the antennas in Suzuki are switched in accordance with a previously determined order or randomly selected based on data generated at random. (Emphasis added, See Suzuki, Column 9, Lines 21-24.) Suzuki does not teach antennas that have the capability of being switched in response to scheduled packet or signal bursts or in response to a request for QoS improvement. This deficiency is not bridged by the teaching of Struhsaker because Struhsaker only teaches that packet data unit may be a complete packet transmission or a fragment of a much larger message. (See Struhsaker, Page 12, Paragraph 159.)

In arguendo, even if Suzuki and Struhsaker were combined, the combination would still not teach or suggest Applicants' invention. The combination of Suzuki and Struhsaker would teach a method and apparatus for transmitting and receiving packet data units that contain a complete message using a number of antennas; where each antenna, that receives the packet data units, is chosen in a pre-determined order or randomly. Therefore, the combination of Suzuki and Struhsaker does not teach or suggest Applicants' invention as recited in independent claim 8.

Dependent claim 10 depends from claim 8 and recites additional limitations. As such, and for the exact same reason set forth above, the Applicants submit that claim 10 is also not made obvious by the teachings of Suzuki and Struhsaker.

E. Claims 14, 17, 21

The Examiner has rejected claims 14, 17 and 21 in the Office Action under 35 U.S.C. § 103 as being unpatentable over Suzuki in view of Ohashi. Applicants respectfully traverse the rejection.

The teachings of Suzuki and Ohashi have been discussed above. However, Ohashi fails to bridge the substantial gap left by Suzuki. Specifically, Ohashi also fails to disclose the novel concept of switching between a first antenna and second antenna in response to a predefined schedule of a sequence of scheduled packet bursts or in response to a request for QoS improvement.

As stated above, Suzuki simply does not teach or suggest the novel concept of switching between a first antenna and second antenna in response to a predefined schedule of a sequence of scheduled packet bursts or in response to a request for QoS improvement. Rather, the antennas in Suzuki are switched in accordance with a previously determined order or randomly selected based on data generated at random. (Emphasis added, See Suzuki, Column 9, Lines 21-24.) Suzuki does not teach antennas that have the capability of being switched in response to scheduled packet or signal bursts or in response to a request for QoS improvement. This deficiency is not bridged by the teaching of Ohashi because Ohashi only teaches a diversity radio communication system that has the ability to request re-transmission of the same data if an error is detected. (See Ohashi, Page 10, Lines 57 – Page 11, Line 2.) Therefore, the combination of Suzuki and Ohashi does not teach or suggest Applicants' invention as recited in independent claims 8 and 13.

Dependent claims 14, 17 and 21 depend from claims 8 and 13 and recite additional limitations. As such, and for the exact same reason set forth above, the Applicants submit that claims 14, 17 and 21 are also not made obvious by the teachings of Suzuki and Ohashi.

F. Claims 19 and 20

The Examiner has rejected claims 19 and 20 in the Office Action under 35 U.S.C. § 103 as being unpatentable over Suzuki in view of Sampath et al. (US 2003/0012308, published January 16, 2003, herein referred to as Sampath). Applicants respectfully traverse the rejection.

The teachings of Suzuki have been discussed above. Sampath teaches a method of adaptive channel estimation for wireless systems. Further, Sampath teaches that signals can be sent with training symbols embedded in data symbols. (See Sampath, Abstract.)

However, Sampath fails to bridge the substantial gap left by Suzuki. Specifically, Sampath also fails to disclose the novel concept of switching between a first antenna and second antenna in response to a predefined schedule of a sequence of scheduled packet bursts or in response to a request for QoS improvement.

As stated above, Suzuki simply does not teach or suggest the novel concept switching between a first antenna and second antenna in response to a predefined schedule of a sequence of scheduled packet bursts or in response to a request for QoS improvement. This deficiency is not bridged by the teaching of Sampath because Sampath only teaches a method of adaptive channel estimation for wireless systems that include the ability to embed training symbols in data symbols. (See Samptah, Abstract.) Therefore, the combination of Suzuki and Sampath does not teach or suggest Applicants' invention as recited in independent claim 8.

Dependent claims 19 and 20 depend from claim 8 and recite additional limitations. As such, and for the exact same reason set forth above, the Applicants submit that claims 19 and 20 are also not made obvious by the teachings of Suzuki and Sampath.

Conclusion

Thus, the Applicants submit that all of these claims now fully satisfy the requirements of 35 U.S.C. §102 and §103. Consequently, the Applicants believe that all

these claims are presently in condition for allowance. Accordingly, both reconsideration of this application and its swift passage to issue are earnestly solicited.

If, however, the Examiner believes that there are any unresolved issues requiring the maintenance of a final action in any of the claims now pending in the application, it is requested that the Examiner telephone Mr. Kin-Wah Tong, Esq. at (732) 530-9404 so that appropriate arrangements can be made for resolving such issues as expeditiously as possible.

Respectfully submitted,

3/25/05

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